STATPREP: TRANSFORMING INTRODUCTORY STATISTICS USING A DATA-CENTERED APPROACH

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Although the world is awash in data, some college faculty members continue to teach statistics using traditional methods and have yet to find ways to incorporate or infuse real data into their classes. The challenge can be acute for faculty who are new to teaching statistics, who may have no or little formal statistics training, and who may feel uncomfortable teaching the course. In addition, the demand for introductory statistics courses continues to grow as program administrators and students realize that statistical training is critical for the future workforce.

The Mathematical Association of America (MAA, https://www.maa.org/) realized that there was a need for professional development for teachers of introductory statistics to bring data into their classes. In conjunction with the American Mathematical Association of Two-Year Colleges (AMATYC, https://amatyc.org/) and the American Statistical Association (ASA, https://www.amstat.org/), the StatPREP grant was proposed to foster the widespread use of data-centered methods and pedagogies in introductory statistics courses.

The goal of the StatPREP Project (National Science Foundation (NSF) grant DUE-1626337) was to train introductory statistics teachers how to navigate the world of real and large data sets and adopt modern data-centric practices in their existing courses. The project was a multi-year effort to bring data centric material and a modern statistical-thinking approach to entry-level statistics courses. The program began in summer 2017 and offered regional workshops around the United States through summer 2022, with 585 people attending StatPREP workshops from 2017–2021. The StatPREP workshops directly addressed the recommendations in the Guidelines for Assessment and Instruction in Statistics Education Report (GAISE College Report ASA Revision Committee, 2016) for teaching statistics. Almost all StatPREP workshop attendees (99%) would recommend a workshop to a colleague, and the workshops and materials helped to both spread GAISE recommendations and to help instructors to teach statistics in alignment with the recommendations. As noted by one attendee, "the workshops were engaging and offered valuable information that I was able to use this semester and some that I plan to implement next semester."

In addition, the StatPREP leadership team and participants developed webinars, tutorials for RStudio, and six open-source, web-based applications called Little Apps, along with associated activities (13) to allow teachers and students to visualize different statistical concepts and to use real and large datasets. The Little Apps were created to provide faculty and students with a consistent and straightforward way to visualize data and statistical concepts. The Little Apps collection includes the following apps.

- Center and Spread (https://maa-statprep.shinyapps.io/Little_App_Spread/)
- Points and Densities (https://maa-statprep.shinyapps.io/Little_App_Density/)
- Confidence and T (https://maa-statprep.shinyapps.io/Little_App_T/)
- Resampling (https://maa-statprep.shinyapps.io/Little_App_Bootstrap/)
- Stratification and Confounding (https://maa-statprep.shinyapps.io/Little_App_Stratify/)
- Regression Modeling (https://maa-statprep.shinyapps.io/Little_App_Regression/)

One workshop participant offered the following commentary on the apps, "My students were missing the conceptual understanding of all the formulas and these apps provided that." The apps and the activities developed to use them are all hosted on the StatPREP website (http://www.statprep.org/) that can be accessed through the MAA website.

REFERENCES

GAISE College Report ASA Revision Committee. (2016). *Guidelines for assessment and instruction in statistics education college report 2016*. American Statistical Association. https://www.amstat.org/docs/default-source/amstat-documents/gaisecollege_full.pdf

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